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1 Computing the Singular-Value Decomposition on the ILLIAC IV

Franklin T. Luk

December 1980 **ACM Transactions on Mathematical Software (TOMS)**, Volume 6 Issue 4

Publisher: ACM Press

Full text available: pdf(689.90 KB) Additional Information: full citation, references, citings, index terms

2 An algorithm for the generalized singular value decomposition on massively parallel computers

Haesun Park, L. Magnus Ewerbring

June 1991 **Proceedings of the 5th international conference on Supercomputing**

Publisher: ACM Press

Full text available: pdf(794.34 KB) Additional Information: full citation, references, index terms

3 The singular value decomposition in multivariate statistics

Sven Hammarling

July 1985 **ACM SIGNUM Newsletter**, Volume 20 Issue 3

Publisher: ACM Press

Full text available: pdf(816.15 KB) Additional Information: full citation, abstract, references

To Gene Golub who has done so much to encourage and advance the use of stable numerical techniques in multivariate statistics.

4 Algorithm 581: An Improved Algorithm for Computing the Singular Value Decomposition [F1]

Tony F. Chan

March 1982 **ACM Transactions on Mathematical Software (TOMS)**, Volume 8 Issue 1

Publisher: ACM Press

Full text available: pdf(302.05 KB) Additional Information: full citation, references, index terms

5 Genetic algorithms: Subproblem optimization by gene correlation with singular value decomposition

Jacob G. Martin

June 2005 **Proceedings of the 2005 conference on Genetic and evolutionary computation GECCO '05**

Publisher: ACM Press

• Full text available: pdf(254.47 KB) Additional Information: full citation, abstract, references, index terms

Several ways of using singular value decomposition (SVD), a linear algebra technique typically used for information retrieval, to decompose problems into subproblems are investigated in the genetic algorithm setting. Empirical evidence, concerning document comparison, indicates that using SVD results both in a savings in storage space and an improvement in information retrieval. Combining theoretical results and algorithms discovered by others, several problems are identified that the SVD can be ...

Keywords: gene decomposition, genetic algorithm, genetic engineering, graph bisection, graph clustering, graph partitioning, linkage learning, probabilistic model building, reduced rank approximation, singular value decomposition, spectral clustering

6 Computation of singular value decomposition on arrays with pipelined optical buses

Yi Pan, Mounir Hamdi

March 1993 **Proceedings of the 1993 ACM/SIGAPP symposium on Applied computing: states of the art and practice SAC '93**

Publisher: ACM Press

Full text available: pdf(651.09 KB) Additional Information: full citation, references, index terms

7 An Improved Algorithm for Computing the Singular Value Decomposition

Tony F. Chan

March 1982 **ACM Transactions on Mathematical Software (TOMS)**, Volume 8 Issue 1

Publisher: ACM Press

Full text available: pdf(695.30 KB) Additional Information: full citation, references, citings, index terms

8 Information retrieval using a singular value decomposition model of latent semantic structure

G. W. Furnas, S. Deerwester, S. T. Dumais, T. K. Landauer, R. A. Harshman, L. A. Streeter, K. E. Lochbaum

May 1988 **Proceedings of the 11th annual international ACM SIGIR conference on Research and development in information retrieval**

Publisher: ACM Press

Full text available: pdf(1.35 MB) Additional Information: full citation, abstract, references, citings, index terms

In a new method for automatic indexing and retrieval, implicit higher-order structure in the association of terms with documents is modeled to improve estimates of term-document association, and therefore the detection of relevant documents on the basis of terms found in queries. Singular-value decomposition is used to decompose a large term by document matrix into 50 to 150 orthogonal factors from which the original matrix can be approximated by linear combination; both documents and terms ...

9 The singular value decomposition for polynomial systems

Robert M. Corless, Patrizia M. Gianni, Barry M. Trager, Stephen M. Watt

April 1995 **Proceedings of the 1995 international symposium on Symbolic and algebraic computation**

Publisher: ACM Press

Full text available: pdf(1.50 MB) Additional Information: full citation, references, citings, index terms

10 Efficient computation of the singular value decomposition on cube connected SIMD machine

H. Y. J. Chuang, L. Chen

August 1989 **Proceedings of the 1989 ACM/IEEE conference on Supercomputing**

Publisher: ACM Press

Full text available: pdf(529.11 KB) Additional Information: full citation, abstract, references, citings, index terms

The singular value decomposition (SVD) has many real-time applications. Recently, there has been much interest in developing efficient methods to compute SVD in parallel machines. This paper presents an efficient method for computing SVD in a cube connected SIMD (single instruction stream - multiple data stream) parallel computer. The method is based on a one-sided orthogonalization algorithm due to Hestenes. In a cube connected SIMD with n/2 processors, the SVD of an

11 Using singular value decomposition to visualise relations within multi-agent systems

Michael Schroeder
April 1999 **Proceedings of the third annual conference on Autonomous Agents**
Publisher: ACM Press
Full text available: pdf(622.70 KB) Additional Information: full citation, references, citings, index terms

Keywords: multi agent systems, singular value decomposition, spring embedding, visualisation

12 A Block Lanczos Method for Computing the Singular Values and Corresponding Singular Vectors of a Matrix

Gene H. Golub, Franklin T. Luk, Michael L. Overton
June 1981 **ACM Transactions on Mathematical Software (TOMS)**, Volume 7 Issue 2
Publisher: ACM Press
Full text available: pdf(976.72 KB) Additional Information: full citation, references, citings, index terms

13 Clustering and singular value decomposition for approximate indexing in high dimensional spaces

Alexander Thomasian, Vittorio Castelli, Chung-Sheng Li
November 1998 **Proceedings of the seventh international conference on Information and knowledge management**
Publisher: ACM Press
Full text available: pdf(1.12 MB) Additional Information: full citation, references, citings, index terms

14 Algorithm 358: singular value decomposition of a complex matrix [F1, 4, 5]

Peter A. Businger, Gene H. Golub
October 1969 **Communications of the ACM**, Volume 12 Issue 10
Publisher: ACM Press
Full text available: pdf(674.04 KB) Additional Information: full citation, references, citings, index terms

Keywords: least squares solution, matrix decomposition, pseudoinverse, singular values

15 The generalized Schur decomposition of an arbitrary pencil A–&lgr;B—robust software with error bounds and applications. Part II: software and applications

James Demmel, Bo Kågström
June 1993 **ACM Transactions on Mathematical Software (TOMS)**, Volume 19 Issue 2
Publisher: ACM Press
Full text available: pdf(1.69 MB) Additional Information: full citation, abstract, references, citings, index

terms, review

Robust software with error bounds for computing the generalized Schur decomposition of an arbitrary matrix pencil A - &lgr;B (regular or singular) is presented. The decomposition is a generalization of the Schur canonical form of A - &lgr;I to matrix pencils and reveals the Kronecker structure of a singular pencil. The second part of this two-part paper describes the computed generalized Schur decomposition in more detail and the software, and presents applications and an exampl ...

Keywords: Kronecker canonical form, Schur decomposition, controllable subspace, generalized eigenvalues, ill-posed problem, matrix pencils, reducing subspaces, uncontrollable modes

16 The generalized Schur decomposition of an arbitrary pencil A–&lgr;B—robust software with error bounds and applications. Part I: theory and algorithms

James Demmel, Bo Kågström

June 1993 **ACM Transactions on Mathematical Software (TOMS)**, Volume 19 Issue 2

Publisher: ACM Press

Full text available: pdf(1.04 MB) Additional Information: full citation, abstract, references, citings, index terms, review

Robust software with error bounds for computing the generalized Schur decomposition of an arbitrary matrix pencil A - &lgr;B (regular or singular) is presented. The decomposition is a generalization of the Schur canonical form of A - &lgr;I to matrix pencils and reveals the Kronecker structure of a singular pencil. Since computing the Kronecker structure of a singular pencil is a potentially ill-posed problem, it is important to be able to compute rigorous and reliable error bou ...

Keywords: Kronecker canonical form, Schur decomposition, controllable subspace, generalized eigenvalues, ill-posed problem, matrix pencils, reducing subspaces, uncontrollable modes

17 Algorithm 805: computation and uses of the semidiscrete matrix decomposition

Tamara G. Kolda, Dianne P. O'Leary

September 2000 **ACM Transactions on Mathematical Software (TOMS)**, Volume 26 Issue 3

Publisher: ACM Press

Full text available: pdf(294.35 KB) Additional Information: full citation, abstract, references, index terms

We present algorithms for computing a semidiscrete approximation to a matrix in a weighted norm, with the Frobenius norm as a special case. The approximation is formed as a weighted sum of outer products of vectors whose elements are ±1 or 0, so the storage required by the approximation is quite small. We also present a related algorithm for approximation of a tensor. Applications of the algorithms are presented to data compression, filtering, and information retrieval; software is p ...

Keywords: compression, latent semantic indexing, matrix decomposition, semidiscrete decompositin, singular value decomposition

18 Macrotasking the singluar value decomposition of block circulant matrices on the Cray-2

J. R. Baker

August 1989 **Proceedings of the 1989 ACM/IEEE conference on Supercomputing**

Publisher: ACM Press

Full text available: pdf(451.75 KB) Additional Information: full citation, abstract, references, index terms

A parallel algorithm to compute the singular value decomposition (SVD) of block circulant matrices on the Cray-2 is described. For a block circulant form described by M blocks with m x n elements in each block, the computation time using an SVD algorithm for general

matrices has a lower bound &OHgr;(M3min(m, n)mn). Using a combination of fast Fourier transform (FFT) and ...

19 A semidiscrete matrix decomposition for latent semantic indexing information retrieval

Tamara G. Kolda, Dianne P. O'Leary
October 1998 **ACM Transactions on Information Systems (TOIS)**, Volume 16 Issue 4
Publisher: ACM Press

Full text available: pdf(201.61 KB) Additional Information: full citation, abstract, references, citings, index terms, review

The vast amount of textual information available today is useless unless it can be effectively and efficiently searched. The goal in information retrieval is to find documents that are relevant to a given user query. We can represent and document collection by a matrix whose (i, j) entry is nonzero only if the ith term appears in the jth document; thus each document corresponds to a columm vector. The query is also represented as a column v ...

Keywords: data mining, latent semantic indexing, semidiscrete decomposition, singular-value decomposition, text retrieval

20 An efficient surface intersection algorithm based on lower-dimensional formulation

Shankar Krishnan, Dinesh Manocha
January 1997 **ACM Transactions on Graphics (TOG)**, Volume 16 Issue 1
Publisher: ACM Press

Full text available: pdf(4.34 MB) Additional Information: full citation, abstract, references, citings, index terms, review

We present an efficient algorithm to compute the intersection of algebraic and NURBS surfaces. Our approach is based on combining the marching methods with the algbraic formulation. In particular, we propose and matrix computations. We present algorithms to compute a start point on each component of the intersection curve (both open and closed components), detect the presence of singularities, and find all the curve branches near the singularity. We also suggest methods to compute the step ...

Keywords: algebraic curve, curve tracing, curve-surface intersection, eigenvalues, loop detection, matrices, singular points, surface-surface intersection

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